CSS

TRANSLATION OF ORIGINAL INSTRUCTIONS
CAREFULLY READ THIS MANUAL BEFORE USING OR REPAIRING THIS PRODUCT

CDR Single Mechanical Seal

Installation, Operating and Maintenance Manual

Pumps UK Ltd | Making the right choice

INDEX

INDEX

This manual provides the users of the mechanical seal unit of C.D.R. Pompe S.r.l. with the information required for correct installation, operation and maintenance under safety conditions as established by EC standards.

Please read this manual carefully before installation and make it available at any time to anyone using the machine.

The user is liable for damage resulting from not observing the operation conditions agreed at Order confirmation.

The Purchaser has the responsibility to:

- Check that the mechanical seal unit and any accessory are suitable for the working environment.
- Provide suitable personal protective equipment to the operators.
- Inform users of the allowed use.

C.D.R. Pompe S.r.l. may update or edit this manual at any time and without previous notice to correct typos, inaccurate information or updated products.

These changes must be added to new editions of the manual.

C.D.R. Pompe S.r.l. has no obligation to install any modification of design or improvement of the products to previously delivered units.

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Any use other than the operation described in the manual is considered improper use and therefore C.D.R. Pompe S.r.l. will not be held responsible in this case.

C.D.R. Pompe S.r.l. is a leader in designing, manufacturing, selling and servicing centrifugal pumps for the treatment of dangerous and corrosive liquids in the chemical and pharmaceutical industries and in other industrial processes.

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1. Introduction

This manual provides the user of UCL series pumps all necessary information to install, operate and maintain the mechanical seals; therefore the operator must read the manual thoroughly so that the product is used correctly, as well as the the manual of the pump on which the mechanical seal is installed.

1.1 Product description

The CSS series seals are balanced and stationary single internal type (that can also be flushed from a non pressurised external source - type Q) and are installed in a conical stuffing box housing.

The materials used for wet parts can be plastic (e.g. fluoropolymer) or sintered (e.g. silicon carbide).

SPECIFICATIONS	DESCRIPTION
Type of seal	Internal single seal
Wet part materials	Carbon / SiC / RS- SiC FKM / EPDM / FFKM
Temperature range	See UCL / UCL-B series pump manual
Operating pressure limits	See UCL / UCL-B series pump manual

1.2 Limit temperature for elastomers

The following table shows the lower and upper operating temperature (in degree Celsius [°C]) for conventional O-rings (elastomers and non-elastomers):

ELASTOMER		RANGE T [°C]	Notes
Ethylene-Propylene Diene Monomer (EPDM)	E62	- 40 ÷ + 140	non-resistant to greases and mineral oils
Fluorocarbon (FPM)	E63	- 20 ÷ + 180	water heated to max 120°C
Perfluoroelastomer (FFKM)	E93	- 20 ÷ + 270	att. swelling with fluoroelastomer solvents
Fluorocarbon enc FEP (FKM enc FEP)	E66	- 20 ÷ + 180	rigid gasket
Silicon enc FEP (VMQ enc PFA)	E65	- 50 ÷ + 200	
Teflon (PTFE)	F44	- 200 ÷ + 260	

WARNING! The temperature range of elastomers shown in the table must always be related to the nature of the pumped liquid.

2. Safety

Use of this manual is subject and connected to the UCL series pump manual.

All provisions for safe installation, operation and maintenance are in chapter 4 of the UCL series pump manual.

Non compliance with safety instructions may cause danger for persons, the environment and the machine, voiding any claim against C.D.R. Pompe S.r.l.

2.1 Expected use

Mechanical seals for UCL series pumps can usually be used for corrosive, toxic or flammable liquids.

The mechanical seal must be completely wet under any operating condition. Do not run the mechanical seal dry at any time, not even for short intervals.

The instructions in the installation, operation and maintenance manual or in the data sheet and/or contractual documentation must be strictly followed; if in doubt please contact C.D.R. Pompe S.r.l.

Please read the following instructions thoroughly. Installation in compliance with the following instructions facilitate long-lasting and efficient operation of the mechanical seal. For all seal auxiliary systems (buffers, exchangers, etc.) see the specific instructions provided separately.

2.2 Improper use

Improper use, even for short periods, may seriously damage the unit (pump and mechanical seal) and in highly-explosive environment it may cause an additional potential ignition source (due to overheating, static currents, sparks, lack of lubrication, etc.): please always follow the pump and seal manual instructions closely.

2.3 Operation in an explosive environment

The CSS-35 mechanical seal is a standard seal, therefore it must be considered a machine element. The machine elements are excluded from the provisions of Directive 94/9/EC (ATEX 95 product directive) since they are considered integral parts of a larger machinery (pump, agitator). This exception was confirmed both by the ATEX permanent committee of the EC and by the European Sealing Association (ESA).

See the following web pages:

EC ATEX permanent committee: http://ec.europa.eu/enterprise/atex/rotating.htm

ESA opinion: http://www.europeansealing.com/statements.html

The manual of the pump in which the seal is installed and this manual are complementary.

See the ATEX section in the pump manual for the allowed temperature limits.

Take particular care when the unit is installed in potentially explosive areas. Avoid any incorrect or improper operation!

3. First supply/Start-up

- Ensure the air (or any vapour) was bled from the pump and particularly from the stuffing box housing.

- Fill and prime the pump before starting it: this is particularly important for pumps equipped with a single mechanical seal. Indeed, in the case of single mechanical seals, the seal is cooled and lubricated only by the process liquid.

3.1 Running the pump

Even if tested by C.D.R. Pompe S.r.l. during the pump operational test, a small leak could still occur during start-up. After a short initial test run, necessary for the seal sliding faces to settle, the leak will gradually decrease.

IMPORTANT! Start the pump as described in the UCL series pump manual.

4. Operation and maintenance

The instructions in the pump manual and those in this manual are complementary.

The static part of the CSS seal is secured to the stuffing box housing by means of 4 stud bolts, to which the fastening nuts are screwed: periodically check that the nuts are tightened by comparing them with the data under "Screw tightening torque table" in the UCL series pump manual.

Please always check the correct position of the rotating seal ring (472) on the shaft sleeve (523) before tightening the self-locking bolt (920.2) on the tie (917) of the pump shaft. This operation must be performed before fastening the volute casing.

Handle the seal rings with utmost care. The silicon carbide and graphite seal rings are extremely fragile. A light impact from a metal object or an accidental fall may be sufficient to chip them beyond repair.

4.1 Seal disassembly

Observe the following general provisions in addition to the instructions in the UCL manual and the regulations of the plant, as a non comprehensive example:

- Wear the relevant personal protective equipment.
- Check that the machine is grounded.
- Cut-off power supply to the pump motor.
- Check that the pump is not under pressure.
- Close the connecting valves of the system.

After disassembling the UCL pump as specified in the relevant manual, proceed as follows:

1) Secure the stuffing box housing (451) to the support frame (346), fastening it with safety screws (914.2).
2) After removing the impeller as described in the UCL pump manual, proceed to remove the key (940.1).
3) Slide out the sleeve (523) with the relevant rotating seal ring (472), taking care not to damage it.
4) Hold the stuffing box housing (451) in position with one hand and undo the safety screws (914.2) at the same time.
5) Remove the stuffing box housing (451), ensuring the mechanical seal (433) remains in its seat.
6) Remove the mechanical seal (433) from the stuffing box housing (451), undoing the relevant locking nuts.

4.2 Seal assembly

Please always see the provisions in the seal manufacturer's manual (if not manufactured by C.D.R. Pompe S.r.l.) and perform an accurate examination to ensure components are not corroded. Otherwise, replace the pump shaft or shaft sleeve.

4.2.1 Checks on pump

- Ensure that all surfaces that may come into contact with the seal are free from burrs and/or sharp edges.
- Check that all junction points are rounded.
- Ensure that edges are blunted.

- Check that the shaft sleeve is not damaged and/or scored.

4.2.2 Checks on pump shaft

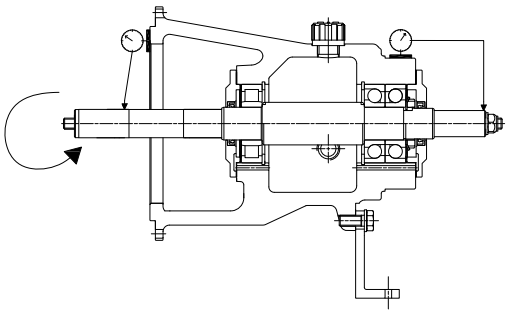


Fig. 1 *Shaft radial oscillation.*

Radial oscillation of the shaft must not exceed 0.05 mm, both for ball bearings and roller bearings; if the shaft cannot be disassembled, inspection must be performed in the area where the mechanical seal seats. The value shown (0.05 mm) applies to 1000-3600 rpm rotation speeds.

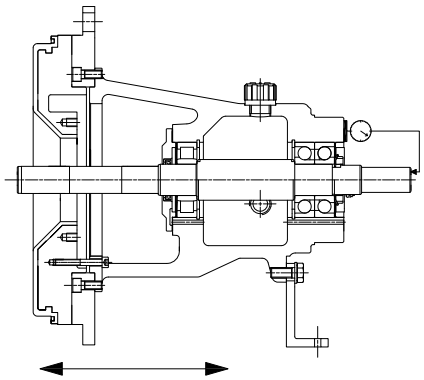


Fig. 2 *Shaft axial clearance.*

The shaft axial clearance after assembly inside the bearing bracket must not exceed 0.25 mm, regardless of the type of thrust bearing installed.

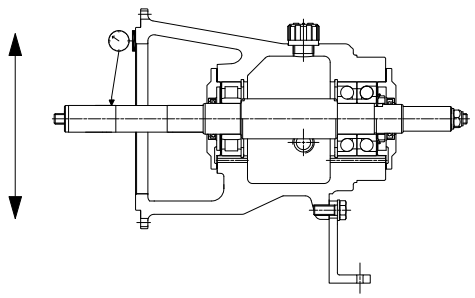
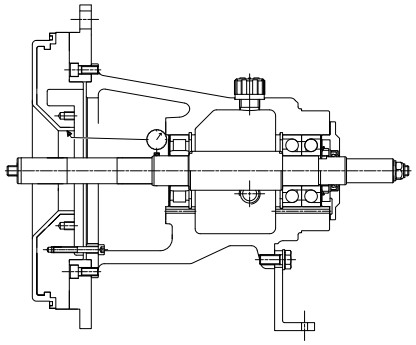


Fig. 3 *Shaft radial clearance.*

The shaft radial clearance after assembly inside the bearing bracket must not exceed 0.10 mm, regardless of the type of thrust bearing installed.



Concentricity between the shaft and the stuffing box housing hole must not exceed 1% of the shaft diameter.

Fig. 4 *Concentricity between shaft and stuffing box housing.*

4.2.3 Checks on seal

- Check the conditions of the seal rings and gaskets.
- Do not use worn or non compliant parts.
- Ensure that springs are still naturally elastic.
- To avoid any possible seizing, ensure the sliding faces are not polluted by grease, oil or dirt of any kind.

4.2.4 Precautions during installation

1) Before assembly always check the size and cross-section drawings of the pump, the seal assembly drawing and the parts list.
2) Ensure the seal is in good conditions when removing it from the box.
3) Seal assembly must be performed in dry conditions in a dust free environment.
4) Do not use oil or grease during assembly.
5) Before assembly, check that the seal faces are completely clean; otherwise, clean them with a solvent (e.g. alcohol) which does not leave residues on the faces. DO NOT LUBRICATE IN ANY WAY!
6) If installation is difficult, wet the seal seat or shaft with denatured alcohol (or water with detergent), taking care not to pollute the seal faces.
7) To set the seal onto the shaft sleeve, use an insertion cone or a pad made of a material that cannot damage the seal (e.g. PTFE). Only for CSS/CDC 35 series seals, the rotating seal ring with gaskets must be set by means of a pad made of a material that would not damage the ring.
8) To facilitate assembly, lubricant may be used for gaskets. The lubricant usually used is silicone, but check it is compatible with the process fluid before using it.

4.2.5 Seal installation

Follow the procedure in chapter "Seal disassembly" in reverse order.

Before assembly, ensure that the seal faces are completely clean, otherwise clean them with a solvent (e.g. alcohol) which does not leave residues on the faces. DO NOT LUBRICATE IN ANY WAY!

Improper tightening of screws/dowels may cause a dangerous situation, since the mechanical seal may move inside the seal chamber when under pressure.

5. Machine stop or storage

The storage environment must have a relative humidity lower than 70% and optimal temperature of approximately 25°C. In any case, the storage temperature range must not exceed the following limits: -20°C / +45°C

When storing the pump with the mechanical seal installed, the storing substance must not affect the function of the mechanical seal. Gaskets must not stick, harden or swell.

After storage for 2-3 years the mechanical seal must be checked to verify that its functional characteristics have not changed. This applies particularly to:

- sealing faces,
- auxiliary sealing elements,
- elasticity and lack of damage of the gaskets.

Inspection must be performed by C.D.R. Pompe S.r.l. or other party authorised by C.D.R. Pompe S.r.l.

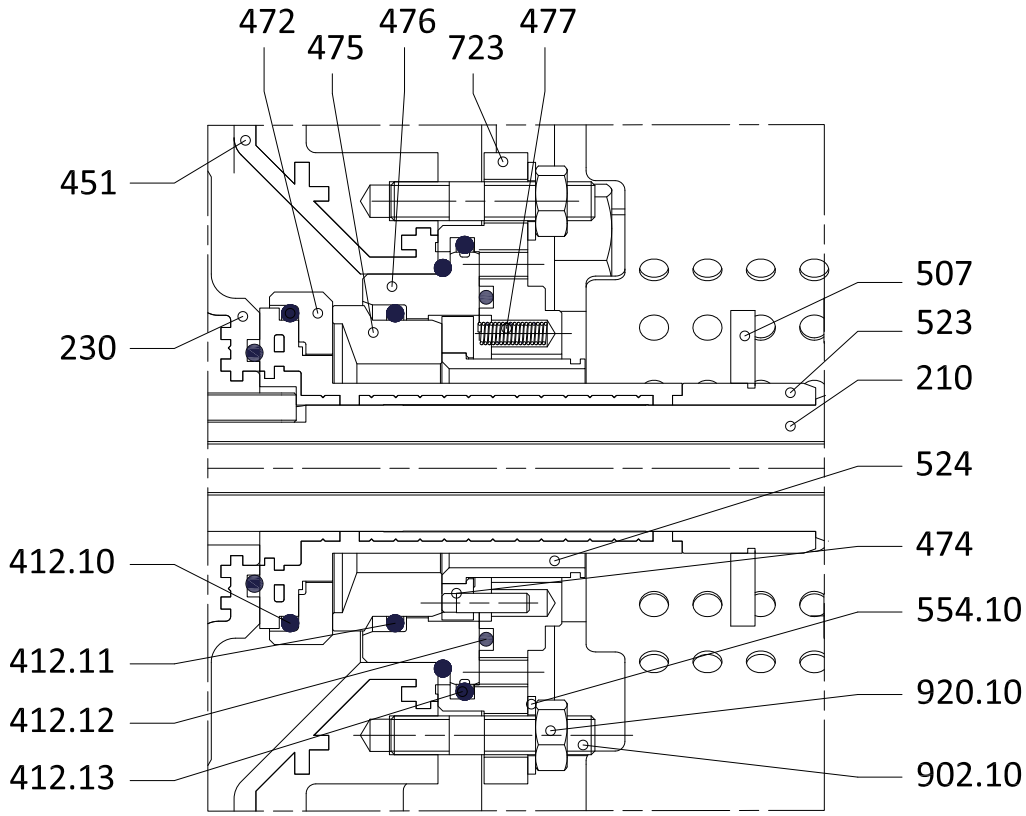


Fig. 5 *CSS*

DIN Cod.	DESCRIPTION
210	Shaft
230	Impeller
451	Stuffing Box Housing
523	Shaft Sleeve
412.10	O-Ring
412.11	O-Ring
412.12	O-Ring
412.13	O-Ring
472	Rotating Seal (Face) ring
474	Thrust Ring
475	Static Seal (Face) ring
476	Stationary Seal Ring Body
477	Spring
507	Splash Guard
524	Protection Sleeve
723	Flange
554.10	Washer
902.10	Stud
920.10	Nut

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